



AG IN THE CLASSROOM—HELPING THE NEXT GENERATION UNDERSTAND THEIR CONNECTION TO AGRICULTURE

Colorado is Rich in Natural Resources and Mining History

The search for gold had a large impact on the settlement and history of Colorado. In 1858, gold was discovered in Cherry Creek (just south of Denver) and the gold rush was on!

As word of riches spread, a rush of prospectors came seeking their fortunes, and mining camps sprang up throughout the mountains. Soon more gold was discovered in Idaho Springs, Blackhawk, Central City, South Park, Boulder, Colorado City, Gold Hill, Hamilton and Tarryall.

During these early years of Colorado history, coal was also discovered near Boulder and in parts of Weld County. At one time, this area had more than 100 coal mines! Most of the coal mined in Colorado today comes from the northwestern part of the state.

With mining came farmers, ranchers, grocery stores, newspapers, banks, schools, stagecoaches and railroads. Over time many mines shut down and some camps turned into ghost

towns. Other towns continued to grow and became cities that we still have today.

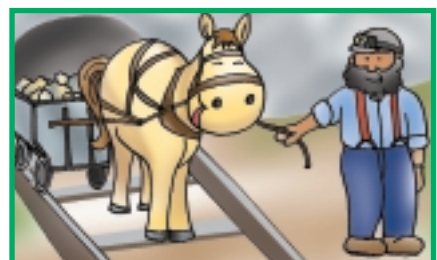
While looking for gold in 1860 in the Leadville area, prospectors found silver ore. Soon Leadville became a bustling mining camp. Mining in this area continued through the 1900s. Zinc and lead were mined in addition to gold and silver.

During this time, additional natural resources were being discovered in Colorado. In 1862 the first oil well was drilled near Florence. In 1879 Molybdenum (pronounced mah-lib-da-num) was found in Climax, north of Leadville. Molybdenum is used to make rockets, jet engines, auto parts and tools. The Climax area was the largest source of molybdenum in the United States.

Radium, vanadium and uranium were discovered near Montrose in 1881. Radium is used in medical testing and uranium is used for nuclear power.

In the late 1800s coal mining around Trinidad and Walsenburg was big business, and in 1882

Pueblo built a steel mill. Electrical power for the mill was generated by burning coal. That was about the same time
(continued on page 2)



Horses, mules and burros helped old-time miners and prospectors in many ways.



Prospectors use gold pans to help find gold in streams and rivers.



Miners use picks and shovels to get ore out of underground mines.

Mining History continued...

telephones and electricity came to Denver.

Colorado's largest gold discovery was made in Cripple Creek in 1891. This area alone produced more than 20 million dollars worth of gold in 1900, making it the fourth largest gold camp in the world.

The discovery of tungsten near Boulder in the early 1900s created another boom. Tungsten is used in light bulbs.

By the 1950s, natural gas joined coal and uranium as sources of energy for the west.

Crushed stone, gypsum, limestone, clay and other materials such as sand, gravel and limestone have been mined for a long time in Colorado. These materials are used to construct roads and buildings.

Central Colorado produces some of the finest white marble in the world. This marble was used to build the Tomb of the Unknown Soldier and part of the Lincoln Memorial in Washington, D.C.

Colorado is also famous for aquamarines, rhodochrosite, beryl, and even diamonds, which were discovered in Larimer County in 1975.

With mountains, canyons and plains, Colorado has great geological diversity that makes our state rich in mineral resources. Mining isn't just a part of Colorado's history—it is a large part of our present and future. Mining and supporting industries contribute nearly 8 billion dollars to our state every year.

Why Is Mining

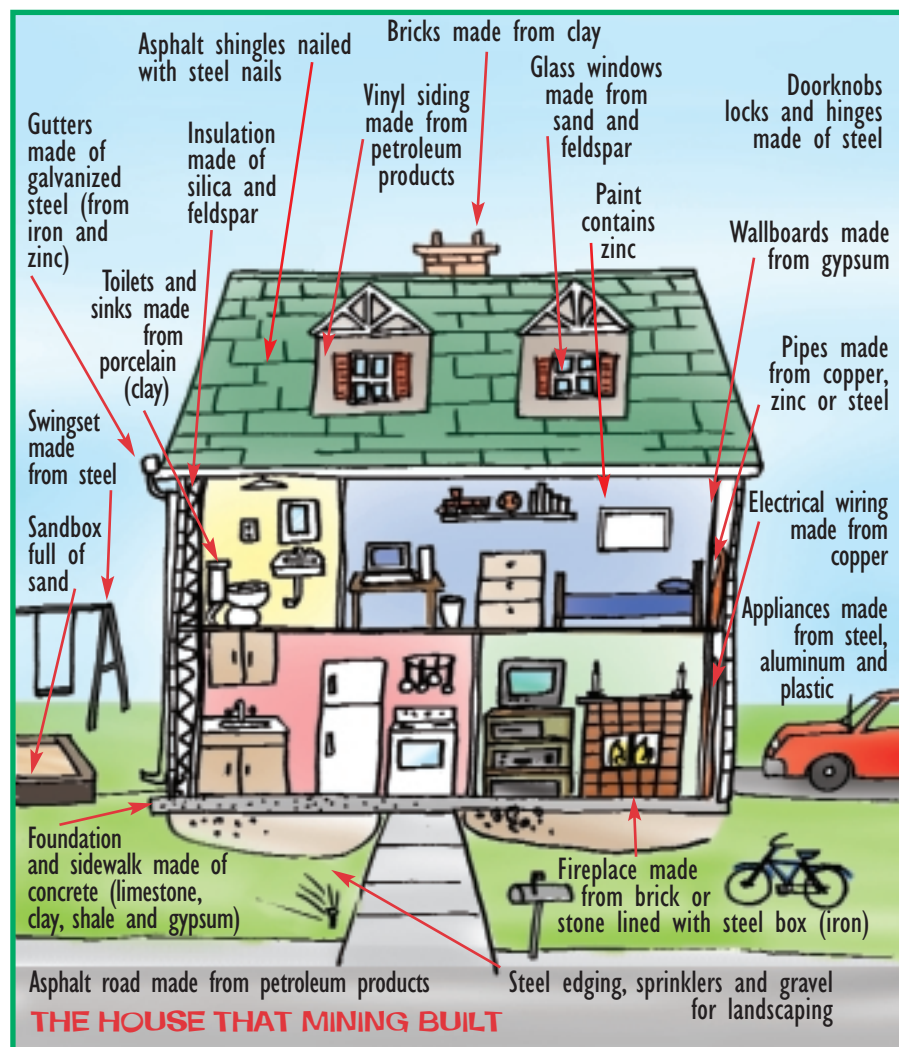
If you've ever played the guessing game *Twenty Questions*, you know one of the first questions asked is, "Is it animal, plant or mineral?" That's because almost everything that is not derived from a plant or animal is made from minerals and petroleum products.

From the time you get out of bed in the morning, brush your teeth and wash your face, to the time you go to bed, you are

continually using products that are made from minerals.

Your toothbrush and toothpaste, soap, comb, toilet, sink and shower are all made from materials that were mined or pumped from the ground.

Then there is your breakfast cereal fortified with zinc and other minerals. Don't forget the ceramic bowl, juice glass and metal spoon, and the muffin you ate made with



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Important To Us?

baking soda. Many fabrics such as polyester and nylon are made from petroleum products. Even the zippers and buttons on your clothes and backpack are probably made from metal or plastic.

Do you ride a bus or bicycle to school? They are both made of many types of metal that are mined. Cars and trucks use gasoline to run. There is asphalt in the road they drive on; limestone

in sidewalks; and bricks, shingles and windows in the school building.

The walls are made from gypsum. The floors may be made with ceramic tiles. Copper is used for electrical wiring. The list goes on: light fixtures, bulbs, computers, calculators, crayons, pencils, blackboards, chalk, chairs and desks. Even the paper found in books and magazines has a clay

coating on it.

You can't go a day without using products that were mined. Minerals are some of our most valuable and widely used natural resources.

FUN FACT

15 different minerals are used to make a car. 35 minerals are used to produce a TV, and 42 separate minerals are used to make a telephone.

Which things are not made with minerals?



Look at the items above and list all the items on the lines below that are not made of minerals:

Why did the prospector
kiss his
mule?



Write the answers for these number problems. Match the letters to the answers on the lines below. Then you'll discover the answer to the question.

I
$$\begin{array}{r} 853 \\ -632 \\ \hline \end{array}$$

Y
$$\begin{array}{r} 189 \\ +406 \\ \hline \end{array}$$

H
$$\begin{array}{r} 11 \\ \times 26 \\ \hline \end{array}$$

C
$$\begin{array}{r} 276 \\ -93 \\ \hline \end{array}$$

P
$$\begin{array}{r} 415 \\ +392 \\ \hline \end{array}$$

A
$$\begin{array}{r} 26 \\ \times 31 \\ \hline \end{array}$$

R
$$\begin{array}{r} 366 \\ -178 \\ \hline \end{array}$$

T
$$\begin{array}{r} 482 \\ +308 \\ \hline \end{array}$$

E
$$\begin{array}{r} 78 \\ \times 16 \\ \hline \end{array}$$

S
$$\begin{array}{r} 995 \\ -231 \\ \hline \end{array}$$

D
$$\begin{array}{r} 590 \\ +471 \\ \hline \end{array}$$

M
$$\begin{array}{r} 64 \\ \times 5 \\ \hline \end{array}$$

286 1248

286 221

790

807 806

595

1061

221

188

790

!

What Is Mining and How Is It Done?

Mining means taking minerals out of the earth. There are many types of mining that are used depending on the type of mineral and where it is located. Holes or tunnels are sometimes dug in the ground to remove ore, metal or other minerals that we use every day.

Surface mining such as open pit or strip mining is used when a mineral is near the surface. An open pit mine usually looks like a deep bowl cut into the earth with sides that look like huge stair steps. This type of mining is done with heavy earth-moving equipment, explosives to break up the ore, and huge trucks that move the ore out of the pit. Some of the minerals removed by surface mining include: gold, coal, iron, gypsum and copper.

Strip mining is a kind of surface mining frequently used for mining coal near the surface. A strip mine looks like a wide, not very deep,

flat-bottomed pit. Heavy equipment is also used for this type of mining. Huge shovels dig and dump trucks carry the ore.

Quarrying is cutting large blocks of rock out of the ground with saws. They are then lifted with cranes and loaded onto trucks. From there they are cut into pieces that can be used for sculpting monuments or construction of buildings and bridges. Rocks such as marble, granite and sandstone are mined this way. Sometimes marble and granite is polished and used for countertops or floors.

Underground mining is used when minerals such as coal, lead and zinc are found deep in the earth. Miners dig vertical shafts into the earth, or if they are mining a hillside they dig a horizontal opening called an adit. From there, horizontal tunnels are dug.

Placer mining is used when minerals are found mixed with sand or gravel along rivers, lakes or oceans. Panning for gold is an example of placer mining. The miner scoops up sand, gravel and water into a pan or sluice box. Using water and a shaking-swirling motion, metals such as gold or platinum sink to the bottom. The sand and gravel wash off in the water at the top.

Dredges which can look like huge 3-story buildings are also used for placer mining. These huge pieces of equipment float on the water and dig material that is as much as 200 feet below the surface. They then use water to separate the minerals from the waste that is put in piles called tailings.

**FUN
FACT**

Some mines are very deep underground, sometimes more than a mile.

STAY OUT-STAY ALIVE!

Every year, dozens of people are injured or killed while playing on mine property. Mines, whether they are old and abandoned or still operating, are very dangerous places. The only

safe thing to do is STAY OUT and STAY ALIVE!

Fences and "No Trespassing" signs are sometimes found on mine properties. You should never climb these fences and

enter mine property. Some old abandoned mines may not have signs or fences. If you should find yourself at an old mine, quarry or gravel pit, leave immediately and stay away.



Do not walk anywhere near mine openings. The ground around shafts, open pits and caves can collapse without warning, and you could fall hundreds of feet down these underground holes. At the surface, they may be hidden by plants or covered by rotting boards.



Do not swim in quarries, pits or mines. You could break your neck diving into the water. There could be sharp rocks or equipment near the surface, and the steep sides make it difficult to get out once you get in. Also, the water may be contaminated with chemicals.



Do not walk through or touch horizontal mine openings or supports. Timbers are used to support the mine's roof or walls and can rot easily. They may seem sturdy, but you could brush against them and cause the entire area to collapse or cave in.



Do not touch equipment or wires on the ground. They might explode. Unused explosives such as dynamite, black powder and blasting caps can be set off by your voice, a touch or a step.



Do not go into old mine buildings. Stairs, ladders or floors may collapse. Never play with equipment. Old buildings might contain explosives, electric hazards or other dangerous materials or equipment.



Do not climb or play on or around piles of tailings, rocks or sand. The entire pile can collapse or slide, hurting you or someone below you.

NEVER GO INSIDE UNDERGROUND MINES



...you could get lost or trapped and starve to death or die from thirst, exhaustion or exposure to the elements.



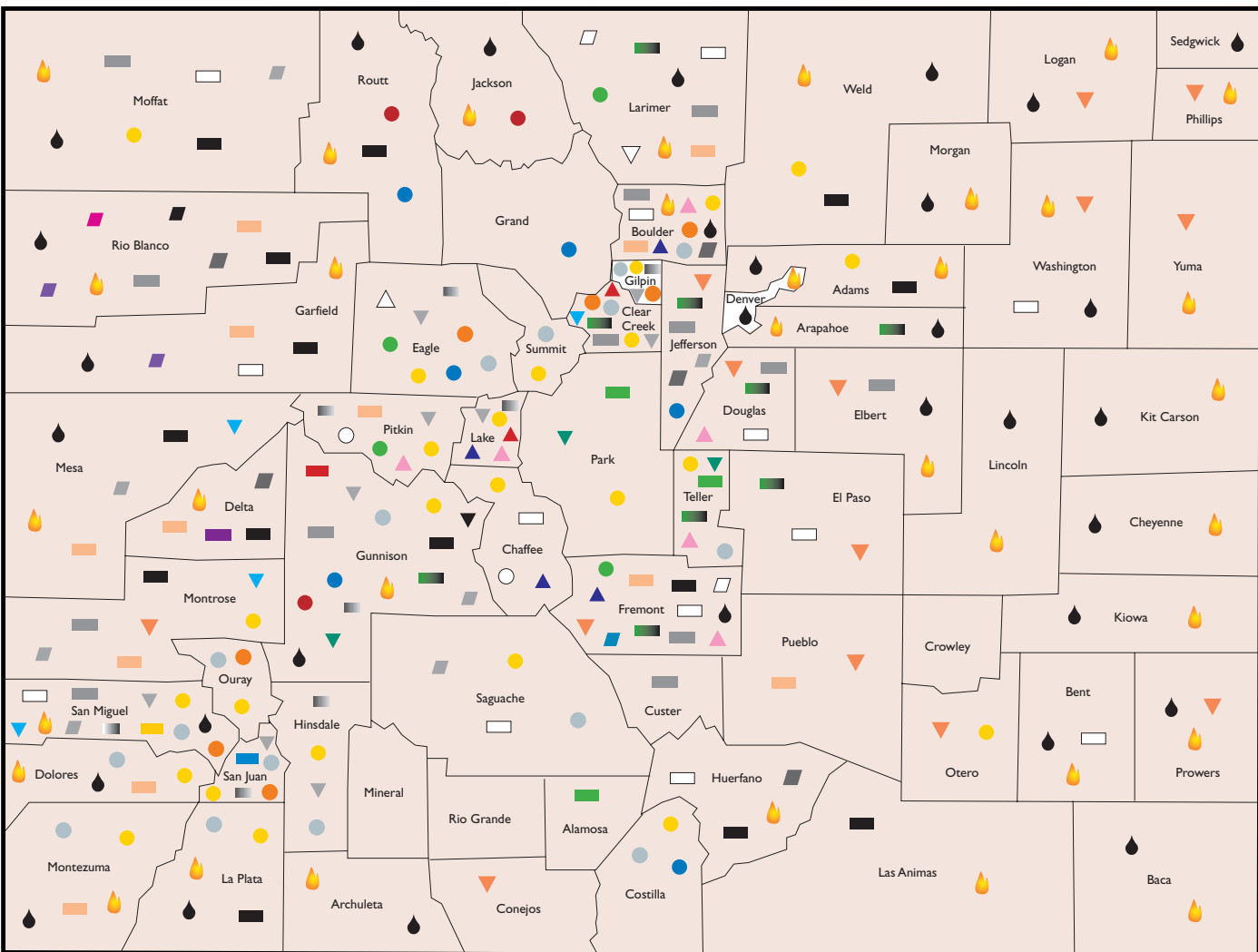
...you might get bitten by poisonous snakes, scorpions or spiders that often live in abandoned mines. Bears and mountain lions may make their homes there too.







































...you might encounter poisonous gases in an abandoned mine. You can come upon these dangerous gases without warning as they are odorless and colorless.

Materials Mined and Produced in Colorado

Directions: Use this map of the State of Colorado to answer the questions below.



All Colorado Counties Mine Sand and Gravel except Denver and Gilpin Counties											
 Ash/Cinders	 Cobalt	 Gemstones	 Lead	 Molybdenum	 Peat	 Silver					
 Cadmium	 Copper	 Gold	 Limestone	 Natural Gas	 Pumice	 Sodium					
 Carbon	 Clay	 Granite	 Lithium	 Oil	 Quartz	 Stone					
 Carbonates	 Diamonds	 Gypsum	 Marble	 Oil Shale	 Sandstone	 Uranium					
 Coal	 Dolomite	 Iron	 Mica	 Ore	 Silica	 Vanadium					
						 Zinc					

1. In which Colorado county are diamonds mined? (It's in the northern part of the state) _____
2. What do people in Baca County mine besides sand and gravel? (Baca is in southeastern Colorado) _____
3. In which county, Lake or Summit, is molybdenum mined? (Both counties are in central Colorado) _____
4. In what county was cadmium mined? (It's in the southwestern part of the state) _____
5. What do people in Teller County mine besides sand and gravel? (Teller County is in central Colorado) _____
6. In which county, Boulder or Jefferson, was copper mined? (Both counties are located near Denver county) _____
7. What do people in Fremont County mine besides sand and gravel? (It's in the south central part of Colorado) _____

What Colorado's Minerals Are Used For:

Ash/Cinders	Concrete, cinder blocks, soil stabilization and back-filling in construction
Cadmium	Batteries, fire detection systems, electric cables, pigments for plastic, ceramics and glass
Carbon	Batteries, bicycle parts, tennis racket parts, parts for wind turbines and the aerospace industry
Carbonates	Cement, mortar and antacids
Coal	Generating electricity (82% of Colorado's electricity is generated from coal), dyes, fertilizer, explosives, synthetic fabrics, fingernail polish, medicines and steel
Cobalt	Airplane engines, ceramics and paint driers
Copper	Plumbing, electric wiring, power lines, TVs and pennies
Clay	Bricks, ceramics, sculpting, paper, paint and kitty litter
Diamonds	Jewelry, cutting blades and drills
Dolomite	Asphalt, pavement, ceramics and fertilizer
Gemstones	Jewelry
Gold	Computers, electronics, jewelry, satellites and dentistry
Granite	Buildings, floors and countertops
Gypsum	Wallboard, plaster and cement
Iron	Pipes, brass, steel, screws, nails, cosmetics and hair dye
Lead	Car batteries, fuel tanks, computers, TV tubes and fishing sinkers
Limestone	Buildings, pavement, cement and fireplaces
Lithium	Ceramics, glass, lubricants, medications and batteries
Marble	Sculpting, bridges, buildings, floors and countertops
Mica	Sheet rock (for walls), paint, hair dye, cosmetics, soap and electronics
Molybdenum	Rockets, jet engines, auto parts, tools and steel
Natural Gas	Heating buildings, vehicle fuel, generating electricity
Oil	Gasoline, heating, asphalt, and plastic
Oil Shale	Fuel, lubricating oil, grease, and fertilizer
Peat	Soil supplementation and waste water treatment
Pumice	Building materials, cleaning and scrubbing products
Quartz	Watches, radios and lighting fixtures
Sandstone	Buildings, walkways, flooring and landscaping
Shale	Paints, plastics, asphalt, and roofing
Silica	Glass, insulation, computer chips, cosmetics, antacids, light bulbs, paint, laundry detergent and drain cleaner
Silver	Jewelry, film, electronics, silverware and dentistry
Sodium	Making table salt, cleaners, glass and baking soda
Stone	Building, construction and landscaping material
Uranium	Generating energy and nuclear defense
Vanadium	Making steel, electronics and ceramics
Zinc	Sunblock, fertilizer, cosmetics, shampoo and paint



Kelley's brother likes to tease her whenever he gets a chance. As Kelley is taking her vitamins one morning, he jokes, "Don't break your teeth on the rocks in there."

Vitamin tablets don't really have rocks in them. But they do contain minerals. Help Kelley find the minerals in the ingredient list below, by circling them.

Supplement Facts:

Cobalamin-Vitamin B12	6 mcg
Retinol-Vitamin A	5000 I.U.
Calcium	100 mg
Ascorbic Acid-Vitamin C	60 mg
Zinc	15 mg
Magnesium	20 mg
Vitamin D	400 I.U.
Phosphorus	100 mg
Thiamin-Vitamin B1	1.5 mg
Copper	2 mg
Riboflavin-Vitamin B2	1.7 mg
Iron	18 mg
Tocopherol-Vitamin E	30 I.U.
Pyridoxine-Vitamin B6	2 mg

**FUN
FACT**

Weld County has the most oil and gas wells in Colorado at over 10,000 (42%).

Every Day Is Earth Day For Miners

Once all the minerals have been taken out of the ground, the mine closes down. Then the work of reclamation begins. This means returning the site to its natural condition so that it can be used by people and animals again.

Today, reclamation is as much a part of mining as taking the minerals out of the earth. Environmental engineers work with wildlife biologists, conservationists and natural resource officials to develop reclamation plans.

Miners take down buildings and remove equipment and roads. Frequently they seal up pits and the shafts from underground mines. Other times instead of closing these openings, miners will partially cover them with metal grates so small animals can live in them. The shaft becomes a manmade cave—perfect for bats and other small creatures.

Water and air pollution are cleaned up, and waste rock or tailings are treated if needed. Then the miners smooth and

even out the ground, fertilize the soil and plant native grass, wildflowers and trees.

Sometimes miners create marshes, ponds and islands that provide habitat for birds, fish and other wildlife such as bald eagles. Wetlands such as these can provide a natural way to clean polluted water. Rivers and lakes may even be stocked with fish for recreational fishing. After reclamation, the animals come back.

In the case of deep open pit mines, it may not be possible to return all the land to its original condition. Sometimes old mines or quarries are used for landfills (for trash) or filled with water for reservoirs or recreational use.

When reclamation is complete mine sites can be used for wildlife refuges, cattle grazing, new home or office developments, farm ground or recreation.

Reclamation can take many years to complete. Once it's done, you might not ever know that mining took place there.

RECYCLING

It's everyone's job to recycle. Metals such as aluminum can be recycled and used again. Aluminum is used for many different things—from the space shuttle to baseball bats, skateboards to pop cans or deodorant.

FUN FACT

It takes 96% less energy to recycle and reuse aluminum than it does to mine and process it in the first place.

Recycling steel uses 74% less energy than mining and refining the ore. And recycling copper saves 87% over mining it for the first time. Even concrete can be recycled from old buildings and roads and reused as road base.

In addition to taking your newspaper, glass and pop cans to a recycling center, you should buy and ask for recycled products. You can do your part to help cut down on the use of natural resources. This will decrease our need for landfills and reduce the amount of energy we use for mining and processing minerals. All of this will save money and help protect the environment!

How many animals can you name that live in this reclaimed mine?

